State of Illinois
Department of Registration and Education
STATE GEOLOGICAL SURVEY DIVISION
John C. Frye, Chief

# GUIDE LEAFLET

## GEOLOGICAL SCIENCE FIELD TRIP

Sponsored by
ILLINOIS STATE GEOLOGICAL SURVEY, URBANA

## FULTON AREA

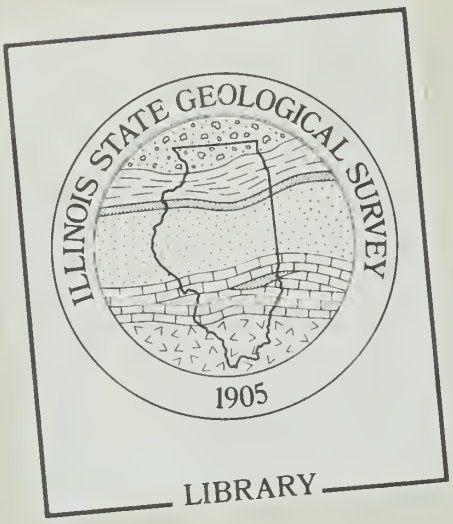
Carroll and Whiteside Counties

Clinton and Savanna Quadrangles

Leaders
George M. Wilson
I. Edgar Odom
Betty J. Hanagan
Urbana, Illinois
September 13, 1958

GUIDE LEAFLET 1958-D

Host: Fulton High School


ILLINOIS STATE GEOLOGICAL SURVEY
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# FULTON GEOLOGICAL SCIENCE FIELD TRIP

Suggestion: Have someone read the guide leaflet as we travel.

0.0 0.0 Caravan assemble at the Fulton Community High School.

0.1 0.1 Turn left.

0.1 0.2 STOP. Turn right (east) on U.S. 30.

0.2 0.4 Dropping off of terrace.

0.2 0.6 SLOW. Turn right (south).

0.3 0.9 STOP. Turn left (east). Enter U.S. 30. The road crosses a portion of the old channel of the ancestral Mississippi River.

1.7 2.6 Note high terrace level on right.

0.3 2.9 CAUTION. Turn right (south) on black top road.

0.1 3.0 SLOW. Rough bridge.

0.2 3.2 CAUTION. Danger. Railroad crossing.

0.1 3.3 SLOW. Note limestone outcrop on left.

Most of the rocks in this part of Illinois are of Silurian age, dipping to the south. The principal geological structure in this region is the Savanna Anticline, and these rocks are on the south flank of this structure. The limestone is a saccharoidal (sugary) dolomite of Racine age. The rock is quite fossiliferous, but preservation of fossils is poor.

0.1 3.4 Rise to higher level of terrace.

0.2 3.6 Note the sand-capped ridge.

0.1 3.7 Note the elongate ridge called a "paha" on the left.

0.2 3.9 Stop 1.

The glaciers that covered Illinois and the northern part of North America spread out from various centers of accumulation in Canada, at different times during the periods of glaciation (Pleistocene). These stages of glaciation are named from the areas of their most typical development, and they are, from the oldest to the youngest, Nebraskan, Kansan, Illinoian, and Wisconsinan. Between the glacial stages were warmer intervals or interglacial stages when soils and profiles of weathering developed on the deposits of glacial drift left by the last glacier.



Glaciers accumulate when the mean average temperature is so low that the winter snows do not all melt during the following summer. This accumulation goes on for hundreds, perhaps thousands of years. The weight of the ice mass finally makes it flow outward. Glaciers advanced as far south as the Missouri and Ohio rivers and south of Carbondale and Harrisburg in Illinois. Some geologists believe that

only a drop of 4 degrees in the mean average temperature will bring a return of the "Ice Age" conditions.

When, for unknown reasons, the mean average temperature rose, the glacial ice, melting more rapidly, halted the advance of the ice front. The earth material that had been picked up and frozen into the advancing ice was dropped when the ice melted. Where the glacial deposit is an unsorted mixture of clay (rock flour), pebbles, or boulders, it is called till.

The melt water pouring out from the ice carried with it much of the finer material such as sand, silt and pebbles. This water-sorted material is called outwash. The coarser outwash material was deposited near the ice front, the finer materials farther away. Where the outwash material was dropped widely as a sort of apron in front of the ice, it is called an outwash plain; where it was dropped in valleys which drained away from the melting ice, it is called a valley-train.

Geologists think that during the fall and winter the melt waters subsided so that the outwash plains and valley-trains were exposed to the winds. The wind picked up silt and fine sand, blew them across the country, sorted the sand into dunes, and beyond the dunes deposited the silt as loess. A covering of loess is found almost everywhere in Illinois and is much thicker near large valleys, which served as major channels during glacial times.

At least three stages of glaciation have influenced the history of this region. The Nebraskan Glacier approached the area from the west. Approaching from both the east and the west, the Kansan ice covered western Illinois from Savanna eastward to Hennepin following near the present channel of the Illinois River and then cutting back across the Mississippi near northern Calhoun county.

The Illinoian ice mass also approached the area. Some geologists believe that the till found in the Stockton area and east of Fulton is Illinoian, while others prefer to call it the earliest Wisconsinan drift or Tazewell. The southern portion of the Clinton sheet with the modified topography has drift that is younger than Tazewell and is thought to be Iowan.

The glaciers that covered this area caused the unusual topography in the southern portion of the region. The thin till plain has deposits of winnowed sand and silt covered with loess. There are some eskers which have been the source of gravel operations. "Pahas," the elongated sand bars, are water deposits which were later modified by the wind. In order to control the slumping and blowing of the fine sand, the surface has been covered with macadam. DO NOT DISTURB THIS SURFACE.

0.5 4.4 Notice the paha on the left.

0.2 4.6 Crossing paha.

0.3 4.9 CAUTION. Cross roads. Turn left (east).

0.6 5.5 Note the Silurian-Racine dolomite outcrops on the left and right.

0.1 5.6 Turn right (south).

0.3 5.9 Crossing paha.

0.2 6.1 Turn left (east).

0.2 6.3 Ridges on right are sand capped. Note dolomite and loess on left side of bluff. We are now travelling along the edge of Cattail Slough in a southeasterly direction. This slough marks one of the former channels of the Mississippi in preglacial and earlier glacial times.

0.4 6.7 Note the Silurian-Racine dolomite outcrop in the stream on the left.

0.3 7.0 Note the terrace remnant on the right.

0.2 7.2 Silurian dolomite outcrop on the right.

0.5 7.7 Terrace remnants on the right.

0.3 8.0 STOP. Caution on entering Detour U.S. Rt. 30. Turn left.

0.1 8.1 Stop 2. Soil profile exposed in ditch.

| | Inches |
|---|---|
| Silt, with soil profile developed, carbonaceous | 18-30 |
| Buff colored silt with sand lenses and an occasional small channel in the lower portion | 24-36 |
| Peaty soil - A zone | 6-15 |
| Silt, brown, heavily oxidized - B zone | 6-8 |
| Silt, oxidized, olive green, with calcareous limonitic concretions around root veinlets - C zone | 36-48 |

Note particularly the silt above the A zone in the buried soil. It is laminated and includes small lines of pebbles.

The subsidence of this road is probably due to the compaction of the peat.

0.6 8.7 Note the sand dune on the left.

0.1 8.8 SLOW. Turn left.

0.1 8.9 Note the depression and blowout characteristics on both sides of the road.

0.2 9.1 Stop 3. Soil profile in loess.

| | Feet | Inches |
|---|---|---|
| Dark humus soil | | 18 |
| Loess, reddish-brown, sticky - B zone | | 36-40 |
| Till, buff colored, gravelly | 3-4 | |

0.1 9.2 Crossing a paha.

0.2 9.4 Crossing another paha. Note the parallelism of these elongate ridges.

0.5 9.9 CAUTION. T-road east.

1.4 11.3 Note the sand in the road-cut on the right.

1.5 12.8 STOP. Turn left (northwest) entering Rt. 30. CAUTION.

0.6 13.4 Note the sand dunes on right and left which developed on the east side of Cattail Slough.

0.8 14.2 SLOW. Turn right.

0.1 14.3 CAUTION. Railroad crossing.

0.1 14.4 Buff dolomite on left side of road.

0.3 14.7 Note dolomite bedrock overlain by 6-8 inch zone of pebbles, which overlies the bedrock. In some instances the pebbles are polished and slightly faceted. Black sand surrounds these pebbles.

0.1 14.8 Deeply weathered loess on right. Color - chocolate brown.

0.3 15.1 SLOW. Overpass.

0.1 15.2 Sand dune on right.

0.5 15.7 Note the dark brown sand on the right. We are travelling along the east edge of Cattail Slough. The sand was probably blown from the barren flats during the fall and winter seasons of the Pleistocene.

0.2 15.9 Stop 4. Alldritt Bros. Quarry.

Enter the quarry and collect fossil corals. CAUTION _ DO NOT CLIMB ON THE WALLS OF THE QUARRY. This quarry is operating in the Waukesha Formation of the Silurian. A large clay vein traverses the quarry from northwest to southeast. Pennsylvanian rock can be found only a few miles south of Port Byron and perhaps these clays are all that is left of the Pennsylvanian in this area. Another suggestion is that the clay is of Cretaceous age.

Silurian rocks in Illinois represent a great accumulation of limestone and dolomite which grew in marine conditions. After this limestone accumulated, the process of dolomitization took place.

The rocks here dip perceptibly to the south because we are on the south flank of the large Savanna Anticline.

0.2 16.1 Note the dolomite outcrop in the pasture on the right.

0.2 16.3 Abandoned quarry on the right. Waukesha Formation.

0.1 16.4 SLOW. Turn right (east).

0.2 16.6 SLOW. Turn left (north). The silts, which may be seen by going up the black top road, were poured into this valley from the east, when glacial Lake Savanna stood at a level of 679 feet. Many of the streams in this area have similar high water silts.

0.7 17.3 Note the terrace remnant. At least three terrace levels are in the present Mississippi valley, at approximately 620, at the general valley elevation of 590-600, and at the lower, present small flood-plain elevation of 580 feet.

0.2 17.5 Turn left (north).

0.3 17.8 Crossing Otter Creek. Streams in this area are leveed so that when there is a heavy rainfall, the water will be taken away without flooding the rich land in the valley.

0.2 18.0 T-road east.

0.2 18.2 Note the large talus block on the left.

0.2 18.4 Exposure of Waukesha Dolomite on right.

0.4 18.8 Exposure of Waukesha Dolomite on right.

0.4 19.2 Terrace remnant on right.

0.7 19.9 The ancestral Mississippi valley.

0.2 20.1 Terrace remnant continues.

0.5 20.6 Note dolomite talus and juniper thicket on right.

0.1 20.7 Terrace remnant.

1.3 22.0 Note the abandoned quarry on right, where the Kankakee, Joliet and lowermost Waukesha formations are exposed.

0.1 22.1 STOP. Turn left (west).

0.2 22.3 Leaving the upper terrace surface and crossing an alluvial fan which has been built by Johnson Creek.

0.8 23.1 CAUTION, Railroad crossing.

1.3 24.4 STOP. Turn left, entering Rt. 80.

0.1 24.5 Stop 5. Turn right (west) Locust Street, to park cars for lunch.

0.1 24.6 Turn right (north) on Market Street.

0.1 24.7 CAUTION. Street intersection. STOP. Turn right (east).

0.1 24.8 STOP, Cross Rt. 80 with caution - entering Rts. 52 and 64.

1.4 26.2 CAUTION, Railroad crossing.

0.4 26.6 SLOW. Turn left (north).

0.3 26.9 CAUTION, Railroad crossing.

0.4 27.3 Stop 6. Park cars and climb hill.

This section is as follows:

| | Feet |
|---|---|
| Loess cover | 20 |
| Silurian System | |
| Joliet Formation, thin bedded, flaggy buff dolomite | 25 |

| | | | Feet |
|---|---|---|---|
| | | Kankakee Formation, dolomite with interbedded white chert | 40 |
| | | Edgewood Formation, massive bedded, silty, buff to gray dolomite | 22 |
| | | Covered interval | |
| | | Ordovician System | |
| | | Maquoketa Formation - green and gray shale | |
| 1.0 | 28.3 | Stop 7. Discussion of Mississippi River Terraces and braided stream channels on the upper terrace level. | |
| 0.5 | 28.8 | Maquoketa Shale and lower Silurian talus on right. | |
| 0.2 | 29.0 | Edgewood Dolomite capping the ridge. The silts are remnants of the old glacial Lake Savanna. | |
| 0.6 | 29.6 | Note the laminated silts in the roadcut on the right. | |
| 0.1 | 29.7 | Turn left (west). Crossing an abandoned channel of the Mississippi River. | |
| 0.8 | 30.5 | West side of old channel - climbing the terrace. | |
| 0.9 | 31.4 | STOP. Turn left (south) entering Rt. 80. | |
| 0.2 | 31.6 | Note old braided channel of upper terrace level on the left. | |
| 4.0 | 35.6 | CAUTION. Railroad crossing. | |
| | | We are dropping from the terrace level. | |
| 1.1 | 36.7 | Climbing terrace. | |
| 0.2 | 36.9 | Stop 8. Sand dunes, blow-outs, and methods used to reclaim the dune area by reforestation. | |
| 4.5 | 41.4 | Turn right (west) on 10th Avenue. CAUTION. Railroad crossing. Enter Fulton. | |
| 0.7 | 42.1 | Note the Silurian dolomite used in the stone wall on right. | |
| 0.3 | 42.4 | Fourth Street - turn right (north). Continue northward out of town. | |
| 0.7 | 43.1 | Stop 9. McKenzie Quarry. | |

The quarry face is quite high, and Mr. McKenzie has insisted that no one climb it.

This section is as follows:

| | Inches |
|---|---|
| Soil, gray silty | 0-8 |
| Clayey loess, yellow-brown, granular texture | 0-28 |

| | Inches |
|---|---|
| Loess, yellow, silty, leached, oxidized, with yellow and gray streaks and blotches, becomes finely sandy at the base | 28-108 |
| Loess, yellow-buff, partially oxidized with gray masses and streaks, calcareous and fossiliferous | 19-31 |
| Farmdale loess, chocolate brown with gray splotches in top 2 feet, with numerous carbonaceous flecks (incipient A horizon). A little more clayey than the Peorian loess above, and with secondary carbonates | 31-37 |
| Loess, chocolate brown, becoming more gray downward and quite silty | 48-60 |
| Sangamon soil profile developed on sands with some gravel showing near the base | 37-44 |

The A Horizon of the Sangamon profile is 4-8 inches thick, silty, reddish brown with some clay accumulation. The noticeable B Horizon is ocherous about 2-3 feet from the top of the Sangamon zone.

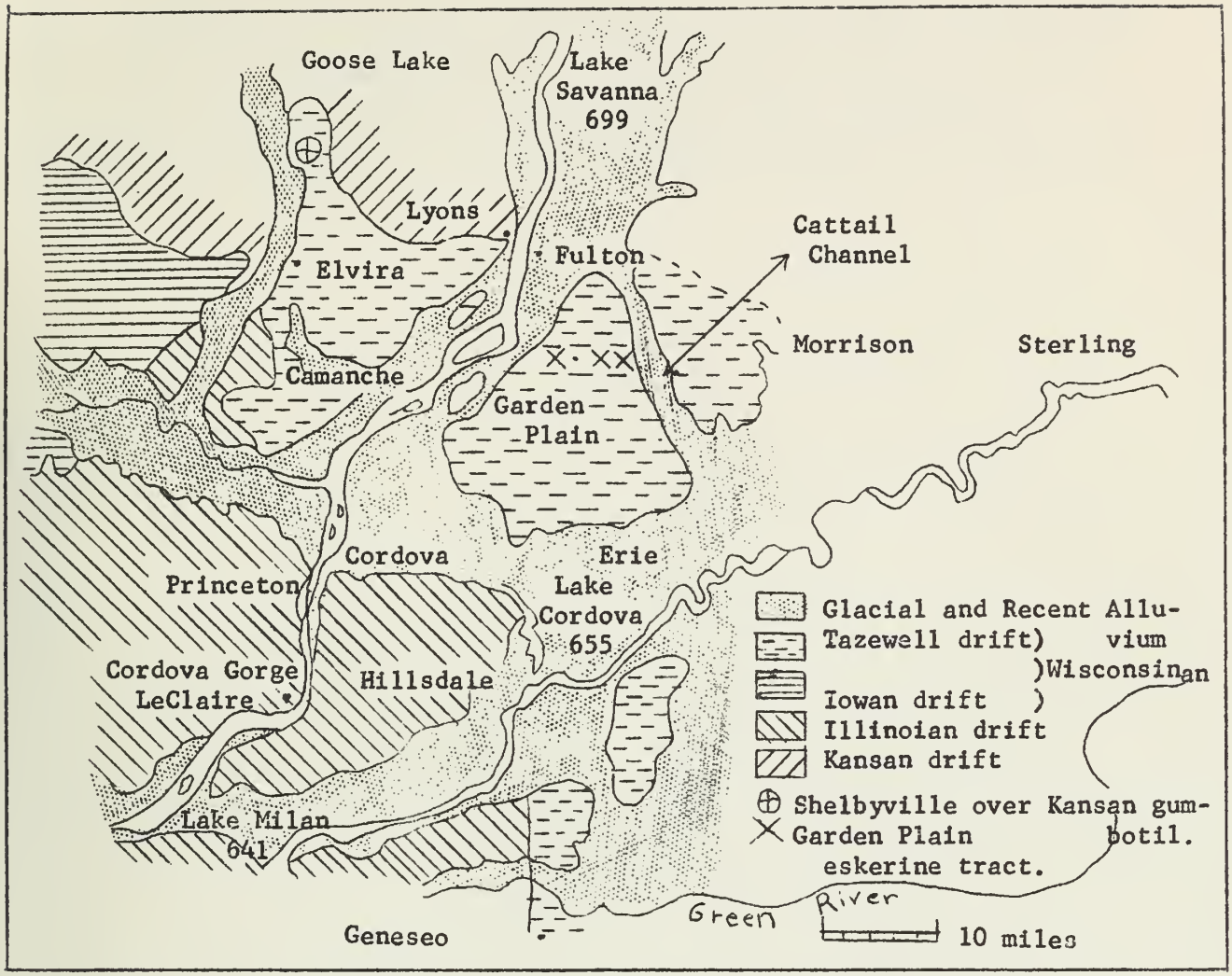
In the bedrock the section is as follows:

| | Inches |
|---|---|
| Silurian System | |
| Waukesha Formation | |
| Thick bedded, biostromal | 30 |
| Joliet Formation - medium to thin bedded, with many corals and brachiopods | 20 |

Revised July 1963.

Time Table of Pleistocene Glaciation
(after M. M. Leighton and H. B. Willman, 1950, J. C. Frye and H. B. Willman, 1960)

| Stage | Substage | Nature of Deposits | Special Features |
|---|---|---|---|
| Recent | | Soil, youthful profile of weathering, lake and river deposits, dunes, peat | |
| Wisconsinan | 5,000 years<br>Valderan | Outwash | Glaciation in northern Illinois |
| | 11,000 years<br>Twocreekan | Peat, alluvium | Ice withdrawal, erosion |
| | 12,500 years<br>Woodfordian | Drift, loess, dunes lake deposits | Glaciation, building of many moraines as far south as Shelbyville, extensive valley trains, outwash plains, and lakes |
| | 22,000 years<br>Farmdalian | Soil, silt and peat | Ice withdrawal, weathering, and erosion |
| | 28,000 years<br>Altonian | Drift, loess | Glaciation in northern Illinois, valley trains along major rivers, Winnebago drift |
| Sangamonian (3rd interglacial) | 50,000 to 70,000 years | Soil, mature profile of weathering, alluvium, peat | |
| Illinoian (3rd glacial | Buffalohartan | Drift | |
| | Jacksonvillian | Drift | |
| | Paysonian (terminal) | Drift | |
| | Lovelandian (Pro-Illinoian) | Loess (in advance of glaciation) | |
| Yarmouthian (2nd interglacial) | | Soil, mature profile of weathering, alluvium, peat | |
| Kansan (2nd glacial) | | Drift<br>Loess | |
| Aftonian (1st interglacial) | | Soil, mature profile of weathering, alluvium, peat | |
| Nebraskan (1st glacial) | | Drift | |




Glacial geology of the Port Byron area, from Illinois Geol. Survey Rept. Inv. No. 174, by Paul Shaffer.

Much of the Port Byron area may have been covered by the Kansan Ice, traces of which are found only a short distance to the northwest, near Lyons, Ia. After each glaciation the Mississippi River and its tributaries, the Wapsipinicon and Pleasant rivers regained their courses.

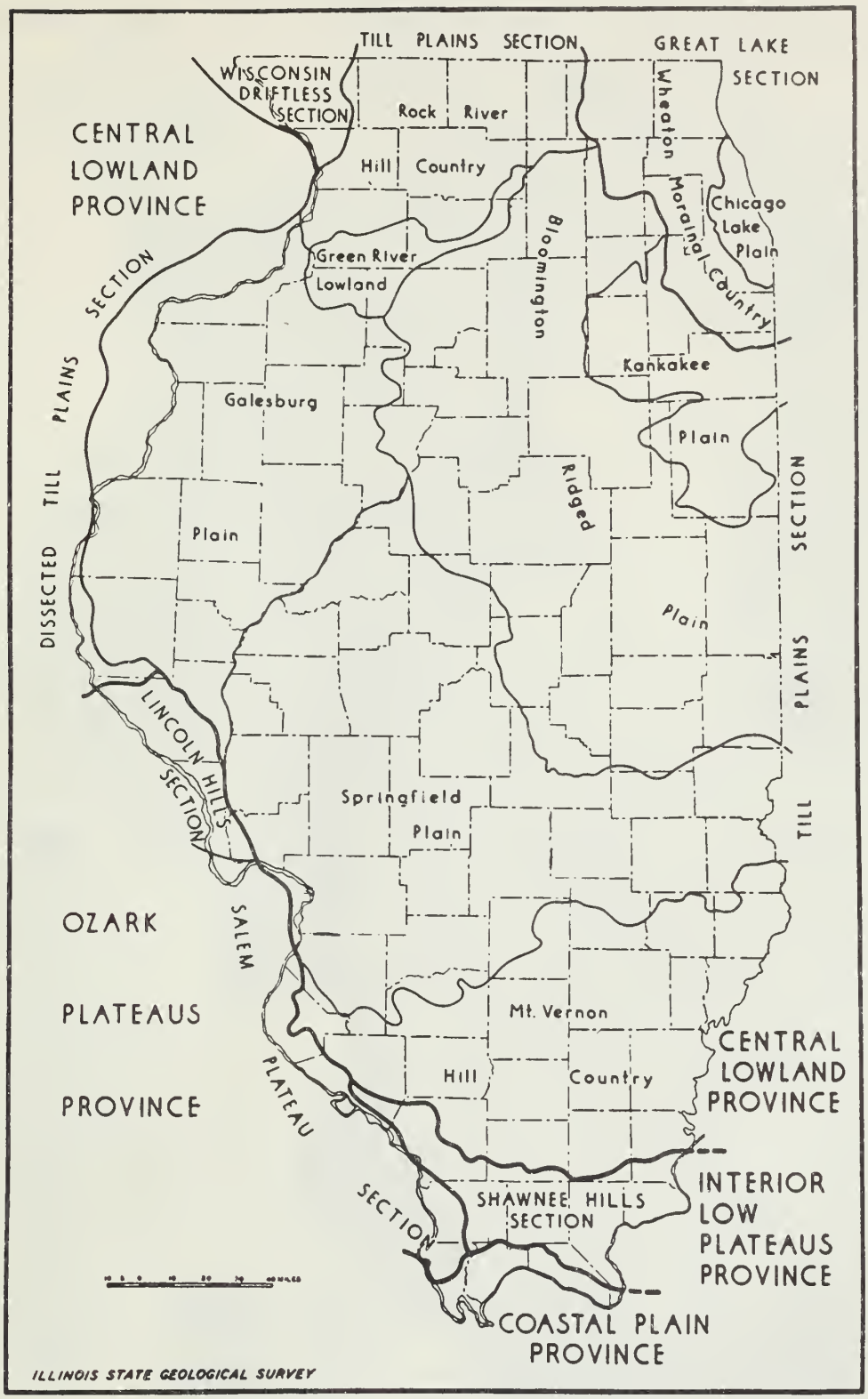
The glacier of the Tazewell substage of the Wisconsinan advanced into this area from the east, blocked the streams and created Lake Milan, which had its outlet westward and southward from Andalusia. When the early Wisconsinan Glacier reached Hillsdale, it raised the lake level in the Mississippi and Wapsipinicon valleys. The water escaped over a col in what is now the Cordova gorge, cutting the valley deeper and deeper.

The maximum advance of the early Wisconsinan Glacier caused the upper Mississippi Valley lake to rise higher and higher. Its waters escaped westward through the Maquoketa valley, south through Goose Lake channel, and east along the ice front to the Cordova gorge. When the early Wisconsinan melted, the Mississippi River followed a new course through the Cordova gorge and the Andalusia outlet.

As the glaciers melted, they liberated volumes of water loaded with mud, sand, gravel, and boulders. The earth materials were carried down streams and into rivers that flowed away from the ice. Streams like the Mississippi River became choked with sediment, which built up the valley floor until the river flowed hundreds of feet above its former level. Winds blowing across the sand and mud flats picked up dust and sand, deposited the sand as dunes along the sides of the valleys, and deposited the dust as loess over the uplands adjacent to the valleys.

GEOLOGIC COLUMN - FULTON AREA

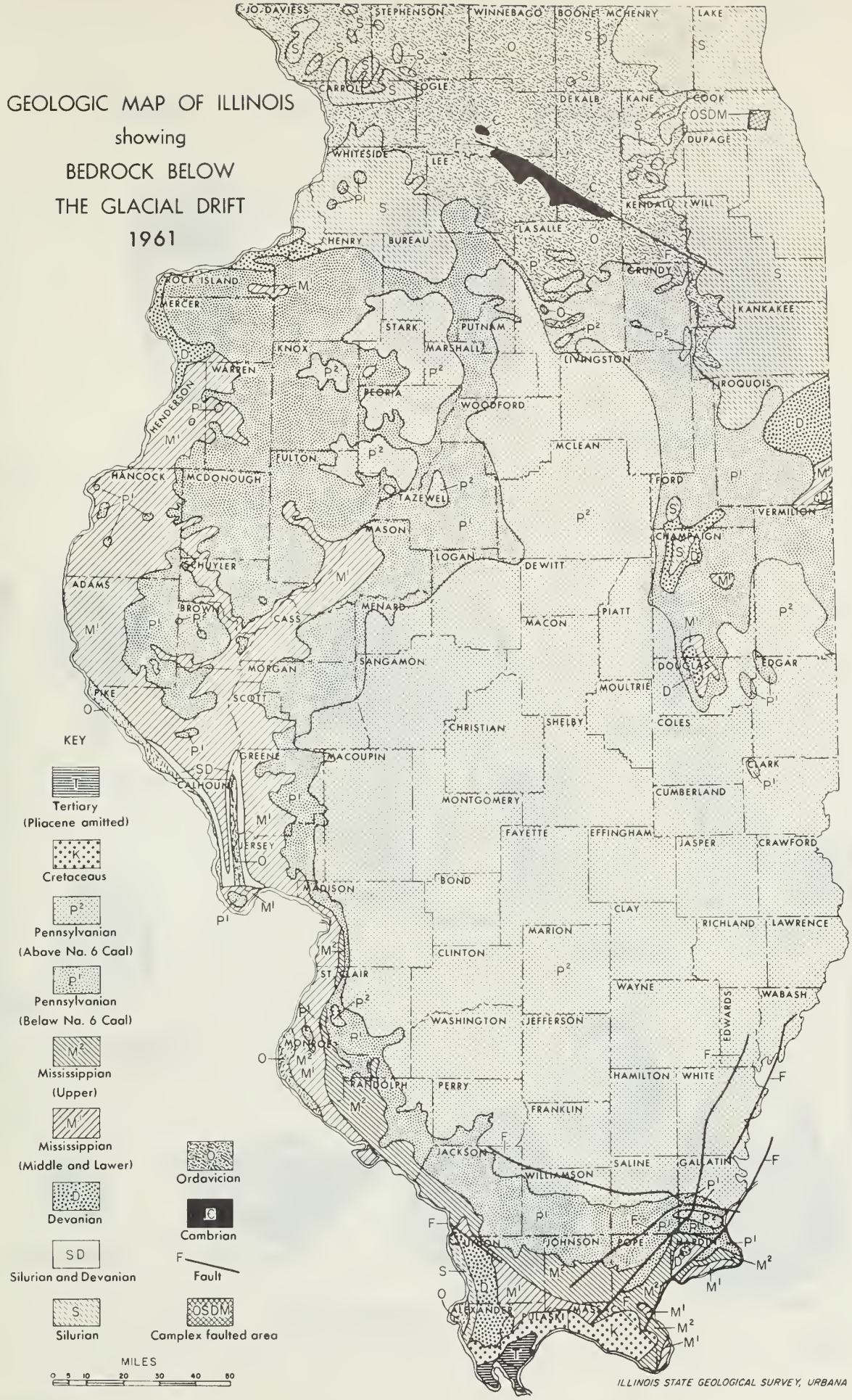
| ERAS | | PERIODS | EPOCHS | REMARKS |
|---|---|---|---|---|
| Cenozoic "Recent life" | Age of Mammals | Quaternary | Pleistocene | Till, loess, and dune sand on uplands; outwash, lake silts and alluvium in river valleys |
| | | Tertiary | Pliocene<br>Miocene<br>Oligocene<br>Eocene<br>Paleocene | Not present in Fulton area |
| Mesozoic "Middle life" | Age of Reptiles | Cretaceous | | Present only in extreme southern Illinois - maybe in clay pockets |
| | | Jurassic | | Not present in Illinois |
| | | Triassic | | Not present in Illinois |
| Paleozoic "Ancient life" | Amphibians & Early Plants | Permian | | Not present in Illinois |
| | | Pennsylvanian | | Present in small areas - maybe |
| | | Mississippian | | Not present in Fulton area |
| | Fishes | Devonian | | Present in Moline area |
| | Age of Invertebrates | Silurian | Cayugan | Not present in Fulton area |
| | | | Niagaran Port Byron<br>Racine<br>Waukesha<br>Joliet | Not present in Fulton area<br>Present in the Fulton area |
| | | | Alexandrian-Edgewood | Present in Fulton area |
| | | Ordovician | Cincinnatian Maquoketa<br>Champlainian Galena | Present in Fulton-Savanna area |
| | | Cambrian | | Not exposed in Fulton area |
| Proterozoic<br>Archeozoic | | Referred to as "Precambrian time" | | No data available |




PHYSIOGRAPHIC DIVISIONS OF ILLINOIS

(Reprinted from Illinois State Geological Survey Report of Investigations 129, "Physiographic Divisions of Illinois," by M. M. Leighton, George E. Ekblaw, and Leland Horberg)

(47669—15M—11-61)




(47669—15M—11-61)

# COMMON TYPES of ILLINOIS FOSSILS

GRAPTOLITE

Cup coral

Lithostrotion

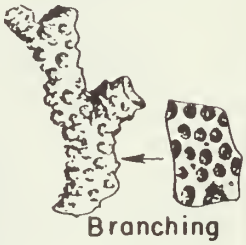
Honeycomb coral

CORALS

CYSTOID

Fenestella

Archimedes



Branching

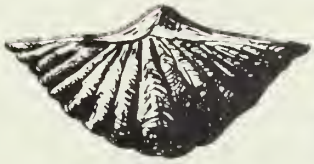
BRYOZOA

CRINOID PENTREMITE

Composita

Lingula

Orbiculoidea



Spiriferoid

Productoid

Pentameroid

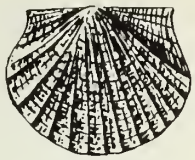
BRACHIOPODS

MMC

(55757—25M—5-62)

# COMMON TYPES of ILLINOIS FOSSILS

"Clam"



"Scallop"

PELECYPODS

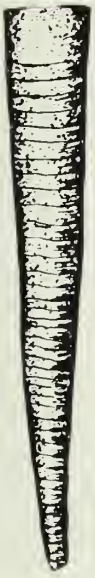
High- spired

Low - spired

Flat - spired

GASTROPODS

Curved cone



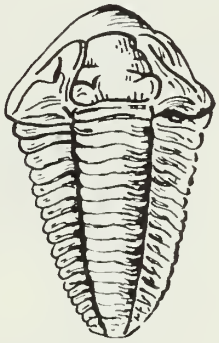
Straight cone

Coiled cone
(Nautilus)

CEPHALOPODS

Bumastus

Calymene
(coiled)



Calymene
(flat)

TRILOBITES

OSTRACODS
(greatly enlarged)

H.M.C.

(55757—25M—5-62)